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TRAINING STATEMENT

COCATS 4 Task Force 13: Training in Critical Care Cardiology

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1. INTRODUCTION

1.1. Document Development Process

1.1.1. Writing Committee Organization

The writing committee was selected to represent the American College of Cardiology (ACC) and included a cardiovascular training program director; a director of a coronary care unit; experts in advanced interventional procedures, cardiothoracic surgery, electrophysiology, and heart failure; early-career experts; highly experienced specialists representing both the academic and community-based practice settings; and physicians experienced in defining and applying training standards according to the 6 general competency domains promulgated by the Accreditation Council for Graduate Medical Education (ACGME) and American Board of Medical Specialties (ABMS) and endorsed by the American Board of Internal Medicine (ABIM). The ACC determined that relationships with industry or other entities were not relevant to the creation of this cardiology training statement. Employment and affiliation details for authors and peer reviewers are provided in Appendixes 1 and 2, respectively, along with disclosure reporting categories. Comprehensive disclosure information for all authors, including relationships with industry and other entities, is available as an online supplement to this document.

1.1.2. Document Development and Approval

The writing committee developed the document, approved it for review by individuals selected by the ACC, and then addressed the reviewers' comments. The document was revised and posted for public comment from December 20, 2014, to January 6, 2015. Authors addressed these additional comments from the public to complete the document. The final document was approved by the Task Force, COCATS Steering Committee, and ACC Competency Management Committee, and ratified by the ACC Board of Trustees in March, 2015. This document is considered current until the ACC Competency Management Committee revises or withdraws it.

1.2. Background and Scope

The field of critical care cardiology has evolved considerably over the past 2 decades. The coronary care unit of the 1970s and 1980s was populated most frequently by patients with acute—and often uncomplicated—myocardial infarction or unstable angina. Detection and rapid treatment of arrhythmias were the primary goals of therapy. Today, patients with acute coronary syndromes, including those with ST-elevation myocardial infarction who have undergone primary percutaneous coronary intervention, may be managed at some institutions in step-down units with continuous telemetry monitoring. At all institutions, contemporary critical care cardiology is increasingly focused on the management of patients with advanced hemodynamic compromise, complex ventricular arrhythmias, and established or incipient multiorgan failure, thus demanding a broader and more in-depth knowledge base and refined skill set than that expected of care providers in years past. In addition, at many institutions, increasing numbers of patients undergoing transcatheter valve therapies or ventricular assist devices are cared for in cardiac intensive care units. A premium is placed, not only on the ability to participate in or lead interdisciplinary

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care teams in this environment, but also on the skills needed to ensure orderly transitions of care once patients are ready for transfer to less intensive hospital units or directly to a rehabilitation facility. The competencies important for the cardiovascular medicine fellow to achieve during critical care cardiology training have not been included in previous iterations of COCATS and are provided here in recognition of the need to define them within the context of this evolving and complex field. Many of the competencies pertinent to critical care cardiology will be acquired during other rotations; these include cardiac catheterization, electrophysiology, and advanced heart failure.

In addition, this report addresses the evolving framework of competency-based medical education described by the ACGME Outcomes Project and the 6 general competencies endorsed by ACGME and ABMS. The background and overarching principles governing fellowship training are provided in the COCATS 4 Introduction, and readers should become familiar with this foundation before considering the details of training in a subdiscipline like critical care cardiology. The Steering Committee and Task Force recognize that implementation of these changes in training requirements will occur incrementally.

For most areas of cardiovascular medicine, 3 levels of training are delineated:

- **Level I training** is the basic training required to become a competent cardiovascular consultant. This level of training is required of all cardiovascular fellows and can be accomplished as part of a standard 3-year training program in cardiovascular medicine. Cardiovascular fellows should be well equipped to manage the majority of patients in a critical care cardiology environment.
- **Level II training** refers to additional training in 1 or more areas that enables some cardiovascular specialists to perform or interpret specific diagnostic tests and procedures or render more specialized care for patients and conditions. This level of training is recognized for those areas in which an accepted instrument or benchmark, such as a qualifying examination, is available to measure specific knowledge, skills, or competence. Level II training in selected areas may be achieved by some trainees during the standard 3-year cardiology fellowship, depending on the trainee's career goals and use of elective rotations. It is anticipated that during a standard 3-year cardiovascular fellowship training program, sufficient time will be available for trainees to receive Level II training in a specific subspecialty. Additional training of this type would signify a strong career interest in critical care cardiology. There are currently challenges to measurement and verification of these additional competencies that require further adjudication. Although some fellows may obtain enhanced procedural skills in the context of a 3-year cardiovascular medicine fellowship by spending additional time (3 to 6 months) dedicated to critical care cardiology experiences, there is currently no Level II designation in this field of cardiology.
- **Level III training** requires advanced training and experience beyond the cardiovascular fellowship to acquire specialized knowledge and competencies in performing, interpreting, and training others to perform specific procedures or render advanced specialized care at a high level of skill. For critical care cardiology, Level III training involves completion of a 1-year clinical fellowship in critical care medicine within the Department of Medicine in addition to the 3-year cardiovascular medicine fellowship (1).

2. GENERAL STANDARDS

The essentials of critical care cardiology should be taught to all fellows. Critical care training should be integrated into the fellowship program and should include the evaluation and management of patients with acute, life-threatening cardiovascular illnesses; exposure to noninvasive and invasive diagnostic modalities commonly used in the evaluation of such patients; familiarity with both temporary and long-term mechanical circulatory support devices; and an understanding of the management of critically ill patients. The majority of critical care cardiology training will occur during dedicated rotations in the cardiac intensive care unit as well as in the cardiac surgical intensive care unit; however, knowledge and skills relevant to critical care cardiology will also be integral components of other rotations, such as electrophysiology (see COCATS 4 Task Force 11 report), advanced heart failure and transplantation (2) (see COCATS 4 Task Force 12 report), cardiac catheterization (see COCATS 4 Task Force 10 report), and imaging (see COCATS 4 Task Force 4 to 8 reports). Acquiring this fundamental knowledge will permit the fellow to diagnose a broad array of cardiovascular disorders, initiate appropriate medical management, and consult when necessary with other specialists to enable further evaluation and treatment. Importantly, the fellow will acquire the skills necessary to work with other care team members in the interdisciplinary management of critically ill patients and demonstrate competency in ensuring safe and orderly transitions of care. These recommendations are congruent with other training documents and address faculty and facility requirements, emerging technologies, and practice (1,3,4). We recommend that candidates for the ABIM examination for certification in cardiovascular diseases, as well as those seeking certification of added qualifications in critical care, review the specific requirements of the ABIM.

Cardiovascular fellowship programs should satisfy the requirements regarding faculty and facilities for training in critical care cardiology. Eligibility for the ABIM examination requires that training take place in a program accredited by the ACGME. The intensity of training and required resources vary with the level of training provided.

2.1. Faculty

Faculty should include dedicated cardiovascular specialists with extensive critical care experience as well as representatives from several cardiovascular specialty disciplines necessary for an interdisciplinary approach to critical care. Cardiovascular critical care specialists should possess adequate knowledge of pharmacological, device-based, and surgical therapies relevant to the field of critical care cardiology. Relevant faculty from various cardiovascular specialties participating in critical care training should include general cardiologists, electrophysiologists, coronary and structural interventionists, heart failure specialists, and surgeons (including those with knowledge of or specialization in the application of advanced hemodynamic support of critically ill patients). Other faculty expected to contribute to the care of critically ill cardiovascular patients include those with expertise in nephrology, neurology, pulmonary medicine, infectious diseases, gastroenterology, hematology, and anesthesiology. The cardiovascular critical care team also includes representation from nursing, pharmacy, respiratory care, nutrition, dialysis, physical/occupational therapy, social work, and hospital ethics committees, among others. All team members contribute to training the cardiovascular fellow in this environment.

There must be at least 1 key clinical faculty member dedicated to training fellows in critical care cardiology. This faculty member should be board-certified in cardiology and demonstrate that she/he is meeting requirements for maintenance of certification. In most instances, this individual will serve as the medical director of the critical care cardiology unit and will assume responsibility for curriculum development and oversight, working in collaboration with the training program director. Sufficient numbers of qualified faculty experts in critical care cardiology must exist to provide direct supervision of all fellows as fellows rotate through the cardiac critical care unit. Critical care faculty should have sufficient experience with the indications for and contraindications to bedside diagnostic and treatment procedures to allow them to independently supervise fellows in their performance (see COCATS 4 Task Force 10 and 11 reports).

2.2. Facilities

Facilities should be adequate to ensure a safe, supportive, efficient, and effective environment for the provision of critical care services to an increasingly complex patient population. The cardiac care unit must be of sufficient size to serve the patient load, with adequate space in each room as determined by staff and equipment needs. Providing separate rooms for each patient is optimal and isolation rooms either within or immediately available to the unit should be utilized as necessary. Sufficient workspace to accommodate staff functions, preferably in a centralized location allowing direct or indirect visualization of all patients at all times, is necessary. To augment routine monitoring of each patient, facilities should include appropriate equipment in each room and at the nursing station. Additional space and resources required for the safe performance of invasive procedures in the cardiac critical care unit (e.g., pulmonary artery catheter or temporary pacemaker placement) should be available.

2.3. Equipment

The critical care unit should be equipped to provide comprehensive bedside monitoring and support. Requirements include continuous electrocardiographic monitoring; invasive arterial, venous, and pulmonary arterial pressure monitoring; oxygen saturation monitoring; bedside imaging; mechanical circulatory support devices; and mechanical ventilator support devices. Equipment should be available for systemic cooling as part of hypothermia protocols and for renal replacement therapy when required. Electronic health record resources should be available to organize patient-related data efficiently and enhance communication among members of the critical care team.

2.4. Ancillary Support Capabilities

Ancillary support should be available to care for critically ill cardiovascular patients, including on-site access to all core cardiovascular and imaging services. These services include cardiac catheterization, echocardiography, and electrophysiology facilities, as well as comprehensive radiology services for brain, vascular, thoracic, abdominal, and pelvic imaging. Required support services also include cardiac surgery, anesthesia, endovascular and interventional radiology, vascular surgery, neurology, nephrology, pulmonary, social work, ethics, palliative care, and pharmacy services with "24/7/365" availability.

3. TRAINING COMPONENTS

3.1. Didactic Program

An important aspect of training in critical care cardiology is didactic instruction. Didactic sessions can occur in a variety of formats, including but not limited to lectures, conferences, journal clubs, grand rounds, and clinical case presentations. The majority of case-based teaching for critical care cardiology will occur during scheduled rotations in the critical care unit, but such teaching need

not be limited to this care site. Rather, teaching that is relevant to the care of critically ill patients will occur throughout the fellowship training program.

3.2. Clinical Cases

Trainees should gain firsthand experience in the evaluation and management of critically ill cardiac patients during unit rotations that include a minimum exposure of 8 (not necessarily consecutive) weeks during the first 24 months of training. Exposure should allow the trainee to obtain the knowledge and skills required to manage the broad spectrum of acute coronary syndromes, mechanical complications of myocardial infarction, acutely decompensated severe heart failure, severe pulmonary hypertension with/without right ventricular failure, circulatory collapse/shock, acute severe heart valve disorders, pericardial tamponade, aortic dissection, hypertensive emergencies, massive or submassive pulmonary embolism, and life-threatening arrhythmias and cardiac conduction disorders. During this exposure, the trainee is expected to demonstrate understanding of and apply the findings from invasive hemodynamic monitoring to patient care and to recognize the indications for advanced interventional or surgical treatments, including mechanical circulatory support, coronary artery bypass grafting, percutaneous coronary intervention, heart valve repair/replacement (including transcatheter techniques), pericardiocentesis, open or endovascular aortic repair, and pulmonary embolectomy or fragmentation. The cardiac critical care unit experience should include opportunities to participate in and, when appropriate, lead interdisciplinary care teams, as noted in Section 2.1.

3.3. Hands-On Experience

Level 1 trainees should demonstrate knowledge and make appropriate use of medications necessary for the treatment of critically ill cardiac patients, including but not limited to inotropic, vasopressor, vasodilator, fibrinolytic, anticoagulant, antiplatelet, antiarrhythmic, sedative, analgesic, and paralytic agents. In addition, over the 24 months of clinical training—and in sequence with cardiac catheterization laboratory rotations—all trainees should develop the skills necessary to insert central venous lines, temporary transvenous pacemakers, radial arterial lines, and balloon-flotation pulmonary artery catheters. All of these procedures may be performed at the bedside. Trainees should recognize the indications for endotracheal intubation, mechanical ventilation, and renal replacement therapy and demonstrate the skills needed to evaluate and treat spontaneous or treatment-related acute bleeding complications. Level I trainees should know the indications for mechanical circulatory support, including intra-aortic balloon counterpulsation and ventricular assist devices (5,6). These trainees should have the skill to utilize therapeutic hypothermia for victims of out-of-hospital cardiac arrest, should demonstrate an understanding of how to integrate palliative and hospice care, and identify when further care is futile. Trainees should also develop the knowledge and skills needed to ensure appropriate transitions of care.

4. SUMMARY OF TRAINING REQUIREMENTS

4.1. Development and Evaluation of Core Competencies

Training and requirements in critical care cardiology address the 6 general competencies promulgated by the ACGME/ABMS and endorsed by the ABIM. These competency domains are: medical knowledge, patient care and procedural skills, practice-based learning and improvement, systems-based practice, interpersonal and communication skills, and professionalism. The ACC has used this structure to define and depict the components of the core clinical competencies for cardiology. The curricular milestones for each competency and domain also provide a developmental roadmap for fellows as they progress through various levels of training and serve as an underpinning for the ACGME/ABIM reporting milestones. The ACC has adopted this format for its competency and training statements, career milestones, lifelong learning, and educational programs. Additionally, it has developed tools to assist physicians in assessing, enhancing, and documenting these competencies.

Table 1 delineates each of the 6 competency domains as well as their associated curricular milestones for training in critical care cardiology. The milestones are categorized into Level I and III training (as previously defined in this document) and indicate the stage of fellowship training (12, 24, or 36 months, and additional time points) by which the typical cardiovascular trainee should achieve the designated level. Given that programs may vary with respect to the sequence of clinical experiences provided to trainees, the milestones at which various competencies are reached may also vary. Level I competencies may be achieved at earlier or later time points. Acquisition of Level III skills requires training in a dedicated critical care cardiology program. The table also describes examples of evaluation tools suitable for assessment of competence in each domain.

4.2. Number of Procedures and Duration of Training

The specific competencies for Levels I and III are delineated in Table 1. Level I competencies must be obtained by all fellows during the 3-year cardiovascular disease fellowship training program. The minimum duration of training for Level I competencies is 8 weeks over the course of the first 24 months of training. Specific

TABLE 1 Core Competency Components and Curricular Milestones for Training in Critical Care Cardiology

	Competency Components	Milestones (Months)			
	MEDICAL KNOWLEDGE	**12**	**24**	**36**	**Add**
1	Know the pathophysiology, differential diagnosis, and characteristic clinical, hemodynamic, radiographic, and laboratory findings of cardiogenic, hypovolemic, septic, and mixed circulatory shock, and of the systemic inflammatory response syndrome.		I		
2	Know the indications for, and characteristic findings with, bedside invasive and noninvasive hemodynamic monitoring.		I		
3	Know the indications, contraindications, and clinical pharmacology for vasoactive and inotropic medications used in the treatment of patients with advanced heart failure, hypotension, or shock.		I		
4	Know the indications, contraindications, and clinical pharmacology for anticoagulant, antiplatelet, and fibrinolytic agents.		I		
5	Know the indications for, contraindications to, and clinical pharmacology of agents used to treat hypertensive urgencies and emergencies.		I		
6	Know the indications, contraindications, and clinical pharmacology for agents used to treat pulmonary hypertension, including intravenous, inhalational, and oral agents.		I		
7	Know the indications, contraindications, and clinical pharmacology for agents used to treat supraventricular and ventricular arrhythmias.		I		
8	Know the indications for, contraindications to, and risks of catheter-based techniques to treat supraventricular and ventricular arrhythmias.		I		
9	Know the characteristic clinical, electrocardiographic, echocardiographic, and radiographic findings with pulmonary embolism, aortic dissection, pericardial tamponade, acute decompensated severe heart failure, severe valvular heart disease, and myocardial infarction.		I		
10	Know the indications for oxygen supplementation, endotracheal intubation, and mechanical ventilator support for patients with hypoxia and/or respiratory failure.		I		
11	Know the differential diagnosis and characteristic laboratory findings of oliguria and acute kidney injury.		I		
12	Know the characteristic physical examination, echocardiographic, angiographic, and hemodynamic findings of mechanical complications of myocardial infarction (e.g., ventricular septal defect, mitral regurgitation, and right ventricular infarction).		I		
13	Know the types of, and indications for, mechanical circulatory support, including intra-aortic balloon counterpulsation, ventricular assist (both percutaneous and surgical) devices, and extracorporeal membrane oxygenation.		I		
14	Know the principles of treatment of hypotension in special populations, including patients with cardiogenic shock, hypertrophic obstructive cardiomyopathy, right ventricular infarction, massive pulmonary embolism, pericardial tamponade, and distributive shock.		I		
15	Know the indications for emergency surgery in patients with aortic dissection.		I		
16	Know the indications for emergent/urgent surgery and transcatheter valve replacement/repair in patients with severe valvular heart disease.		I		
17	Know the differential diagnosis of heart failure or shock in cardiac transplant patients.		I		
18	Know the elements of risk scoring systems for the assessment of prognosis in acute coronary syndrome, advanced heart failure, and pulmonary hypertension, including demographics and findings from the clinical examination, electrocardiogram, biomarker testing, angiography, echocardiography, and invasive hemodynamic assessment.		I		
19	Know the indications for use of hypothermia protocols and the principles of postresuscitation bundled care.		I		
20	Know the elements of scoring systems for assessment of the risk of major bleeding in patients treated with antithrombotic medications.		I		
	EVALUATION TOOLS: conference presentation, direct observation, in-training examination, and simulation.				
	PATIENT CARE AND PROCEDURAL SKILLS	**12**	**24**	**36**	**Add**
1	Skill to manage patients with acute myocardial infarction and any associated rhythm, conduction, or mechanical complications.		I		
2	Skill to evaluate and manage acutely unstable cardiac patients by integrating the findings from clinical, electrocardiographic, telemetry, imaging, and hemodynamic assessment—and to develop a plan for bedside intervention.		I		

TABLE 1 Core Competency Components, continued

Competency Components		Milestones (Months)			
PATIENT CARE AND PROCEDURAL SKILLS		**12**	**24**	**36**	**Add**
3	Skill to place arterial, central venous, and pulmonary artery catheters and temporary transvenous pacemakers in sequence with cardiac catheterization laboratory rotations.		I		
4	Skill to recognize when renal replacement therapy is indicated, and to manage in conjunction with nephrology consultants.		I		
5	Skill to appropriately utilize therapeutic hypothermia protocols in survivors of cardiac arrest in conjunction with neurological consultants.		I		
6	Skill to evaluate and manage patients with hemodynamic instability following cardiac surgery.		I		
7	Skill to evaluate and manage patients with hemodynamic instability following transcatheter valve therapy.		I		
8	Skill to evaluate and manage supraventricular and ventricular arrhythmias and conduction disturbances in unstable patients in collaboration with electrophysiology specialists.		I		
9	Skill to use vasopressor and inotropic therapy appropriately in various types of shock.		I		
10	Skill to incorporate mechanical circulatory support in the management of critically ill patients.		I		
11	Skill to place intra-aortic balloon pump emergently.				III*
12	Skill to identify and manage pericardial tamponade, including emergency pericardiocentesis.		I		
13	Skill to participate in the perioperative care of heart transplant and ventricular assist device patients, in collaboration with heart failure experts, interventional cardiologists, and surgical consultants.		I		
14	Skill to monitor blood pressure and hemodynamic state in patients with continuous flow left ventricular assist devices, in collaboration with heart failure specialists, interventional cardiologists, and/or surgeons.		I		
15	Skill to manage hypertensive urgencies and emergencies.		I		
16	Skill to manage special populations of critically ill cardiovascular patients including those with aortic dissection, massive or submassive pulmonary embolism, acute severe valvular regurgitation, and advanced pulmonary hypertension with right ventricular dysfunction.		I		
17	Skill to manage patients with acute bleeding, including bleeding from vascular access or spontaneous bleeding.		I		
18	Skill to perform noninvasive ventilation and CO_2 monitoring.		I		
19	Skill to incorporate oxygen supplementation and mechanical ventilation in patient management.		I		
20	Skill to perform endotracheal intubation.				III
21	Skill to utilize risk assessment scoring systems when appropriate in patient management and counseling.		I		
22	Skill to identify when further medical care is futile and to counsel families on end-of-life care.		I		
23	Skill to coordinate safe and effective transitions of care in collaboration with other members of the care team.		I		
	EVALUATION TOOLS: conference presentation, direct observation, logbook, and simulation.				
SYSTEMS-BASED PRACTICE		**12**	**24**	**36**	**Add**
1	Work effectively with all members of the critical care unit team including heart failure/transplant specialists, electrophysiologists, interventionalists, surgeons, pulmonary critical care physicians, nephrologists, neurologists, nurses, physician's assistants, pharmacists, social workers, and other team members as required.		I		
2	Function effectively as team leader for the critical care unit team.				III
3	Participate in hospital quality and safety initiatives in the critical care units.		I		
4	Design quality and safety initiatives.				III
5	Utilize interdisciplinary input and expertise in comanagement of critically ill patients, including transitions of care.		I		
	EVALUATION TOOLS: conference presentation, direct observation, and multisource evaluation.				
PRACTICE-BASED LEARNING AND IMPROVEMENT		**12**	**24**	**36**	**Add**
1	Identify knowledge and performance gaps and engage in opportunities to achieve focused education and performance improvement.		I		
2	Utilize point-of-service resources to enhance adherence to guidelines and protocols and obtain new information from trials and professional societies.		I		

TABLE 1 Core Competency Components, continued

Competency Components		Milestones (Months)			
PRACTICE-BASED LEARNING AND IMPROVEMENT		**12**	**24**	**36**	**Add**
3	Incorporate appropriate use criteria, risk/benefit analysis, and cost considerations in the use of testing and treatment.		I		
	EVALUATION TOOLS: conference presentation and direct observation.				
PROFESSIONALISM		**12**	**24**	**36**	**Add**
1	Work effectively in an interdisciplinary critical coronary care unit environment.		I		
2	Demonstrate sensitivity to patient preferences and values and end-of-life issues.		I		
3	Practice within the scope of expertise and technical skills.		I		
4	Interact respectfully with patients, families, and all members of the healthcare team, including ancillary and support staff.		I		
	EVALUATION TOOLS: conference presentation, direct observation, and multisource evaluation.				
INTERPERSONAL AND COMMUNICATION SKILLS		**12**	**24**	**36**	**Add**
1	Communicate with and educate patients and families across a broad range of cultural, ethnic, and socioeconomic backgrounds.		I		
2	Communicate and work effectively with physicians and other professionals on the healthcare team in the management of critically ill patients and their transition to other care environments.		I		
3	Communicate with families with regard to end-of-life decisions with respect to programming of pacemakers and implantable cardioverter-defibrillators.		I		
	EVALUATION TOOLS: direct observation and multisource evaluation.				

*Fellows seeking to gain the skill to insert intra-aortic balloon pumps emergently may do so as part of Level II training in cardiac catheterization (see COCATS 4 Task Force 10 report).
Add = additional months beyond the 3-year cardiovascular fellowship.

procedural volume targets are not provided. Many of these will be obtained during other rotations, such as cardiac catheterization and electrophysiology. Nevertheless, outcomes-based evaluation measures must demonstrate that such competencies have been achieved. Designation of Level II competencies will require further clarification once additional experience is gained with the critical care cardiology pathway. Level III competencies are noted so that fellows are aware of the competencies for which additional, advanced training beyond the standard 3-year fellowship is required. Level III training could be accomplished with a dedicated year of critical care medicine training, in conjunction with the Department of Medicine at the sponsoring institution. A brief discussion of the competencies and training requirements for Levels I, II, and III follows. Although the minimum training duration and numbers of procedures are typically required to obtain competency, trainees must also demonstrate achievement of the competencies as assessed by the outcomes evaluation measures.

4.2.1. Level I Training Requirements

Level I training will typically require at least 8 weeks of cardiology critical care exposure designed to allow the trainee to acquire the knowledge, skills, and experience necessary to achieve the competencies listed in Table 1. Because both dedicated critical cardiology time and complementary experiences necessary to gain knowledge and skills through other cardiovascular rotations may be assigned at various times to trainees over the first 24 months of training, the milestones for the relevant competencies should be reached by 24 months.

4.2.2. Future Level II Training Requirements

Level II training will involve more advanced knowledge and skills than Level I training, likely with greater experience with bedside procedures and the skills needed for leading interdisciplinary teams managing critically ill patients, but not with the competency expected with Level III training. Preliminarily, an additional 3 to 6 months of clinical training within the 3-year cardiovascular medicine fellowship is envisioned to acquire these skills, but at present Level II training in critical care cardiology is not recognized.

4.2.3. Level III Training Requirements

Level III training prepares the physician to specialize in critical care cardiology. Level III requires additional

experience beyond the standard 3-year cardiovascular fellowship for the trainee to acquire specialized knowledge and competencies in performing, interpreting, and training others to perform specific critical care functions and procedures or render advanced, specialized critical care at a high level of skill. Trainees should obtain additional critical care medicine training within the department of medicine upon completing a 3-year cardiovascular fellowship. A portion of this advanced training can be spent under supervision in cardiac or cardiac surgical intensive care units, as specified by the critical care medicine fellowship program. Level III training is described here only in broad terms to provide context for trainees and clarify that these advanced competencies are not covered during the general cardiology fellowship. The additional exposure and requirements for Level III training will be addressed in a subsequent, separately published Advanced Training Statement.

5. EVALUATION OF COMPETENCY

Evaluation tools in critical care cardiology include direct observation by instructors, in-training examinations, case logbooks, conference and case presentations, multisource evaluations, trainee portfolios, and simulation. Case management, judgment, interpretive, and bedside skills must be evaluated in every trainee. Quality of care and follow-up; reliability; judgment, decisions, or actions that result in complications; interaction with other physicians, patients, and laboratory support staff; initiative; and the ability to make appropriate decisions independently should be considered. Trainees should maintain records of participation and advancement in the form of a Health Insurance Portability and Accountability Act (HIPAA)-compliant electronic database or logbook that meets ACGME reporting standards and summarizes pertinent clinical information (e.g., number of cases, diversity of referral sources, diagnoses, disease severity, outcomes, and disposition).

Under the aegis of the program director, the faculty should record and verify each trainee's experiences, assess performance, and document satisfactory achievement. The program director is responsible for confirming experience and competence and reviewing the overall progress of individual trainees with the Clinical Competency Committee to ensure achievement of selected training milestones and to identify areas in which additional focused training may be required.

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KEY WORDS ACC Training Statement, clinical competence, COCATS, critical care cardiology, fellowship training

APPENDIX 1. AUTHOR RELATIONSHIPS WITH INDUSTRY AND OTHER ENTITIES (RELEVANT)—COCATS 4 TASK FORCE 13: TRAINING IN CRITICAL CARE CARDIOLOGY

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For the purpose of developing a general cardiology training statement, the ACC determined that no relationships with industry or other entities were relevant. This table reflects authors' employment and reporting categories. To ensure complete transparency, authors' comprehensive healthcare-related disclosure information—including relationships with industry not pertinent to this document—is available in an online data supplement. Please refer to http://www.acc.org/guidelines/about-guidelines-and-clinical-documents/relationships-with-industry-policy for definitions of disclosure categories, relevance, or additional information about the ACC Disclosure Policy for Writing Committees.

ACC = American College of Cardiology.

APPENDIX 2. PEER REVIEWER RELATIONSHIPS WITH INDUSTRY AND OTHER ENTITIES (RELEVANT)—COCATS 4 TASK FORCE 13: TRAINING IN CRITICAL CARE CARDIOLOGY

Name	Employment	Representation	Consultant	Speakers Bureau	Ownership/ Partnership/ Principal	Personal Research	Institutional/ Organizational or Other Financial Benefit	Expert Witness
Richard Kovacs	Indiana University, Krannert Institute of Cardiology—Q.E. and Sally Russell Professor of Cardiology	Official Reviewer, ACC Board of Trustees	None	None	None	None	None	None
Dhanunjaya Lakkireddy	Kansas University Cardiovascular Research Institute	Official Reviewer, ACC Board of Governors	None	None	None	None	None	None
Howard Weitz	Thomas Jefferson University Hospital—Director, Division of Cardiology; Sidney Kimmel Medical College at Thomas Jefferson University—Professor of Medicine	Official Reviewer, Competency Management Committee Lead Reviewer	None	None	None	None	None	None
Mardi Gomberg-Maitland	University of Chicago Medicine—Associate Professor, Medicine, Cardiology; Director, Pulmonary Hypertension	Content Reviewer, Individual	None	None	None	None	None	None
David Holmes	Mayo Clinic—Consultant, Cardiovascular Diseases	Content Reviewer, Individual	None	None	None	None	None	None
Larry Jacobs	Lehigh Valley Health Network, Division of Cardiology; University of South Florida—Professor, Cardiology	Content Reviewer, Cardiology Training and Workforce Committee	None	None	None	None	None	None
Andrew Kates	Washington University School of Medicine	Content Reviewer, Academic Cardiology Section Leadership Council	None	None	None	None	None	None
Eric Peterson	Duke Clinical Research Institute—Executive Director; Duke University Medical Center—Professor, Medicine	Content Reviewer, Individual	None	None	None	None	None	None

For the purpose of developing a general cardiology training statement, the ACC determined that no relationships with industry or other entities were relevant. This table reflects peer reviewers' employment, representation in the review process, as well as reporting categories. Names are listed in alphabetical order within each category of review. Please refer to http://www.acc.org/guidelines/about-guidelines-and-clinical-documents/relationships-with-industry-policy for definitions of disclosure categories, relevance, or additional information about the ACC Disclosure Policy for Writing Committees.

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APPENDIX 3. ABBREVIATION LIST

ABIM = American Board of Internal Medicine

ABMS = American Board of Medical Specialties

ACC = American College of Cardiology

ACGME = Accreditation Council for Graduate Medical Education

COCATS = Core Cardiovascular Training Statement

HIPAA = Health Insurance Portability and Accountability Act